

REMARKS/ARGUMENTS

Applicant has added multiple dependent claim 72 to claim the invention as comprising a composition of any one of claims 58-62, 67-71 where said composition is substantially anhydrous. The paragraph bridging pages 31-32 of the written description supports this amendment.

Applicant traverses the June 12, 2003 rejection of the application for all of the reasons set forth in his Brief on Appeal filed January 22, 2003 incorporated herein by reference in its entirety.

Specifically, the Examiner rejects claims 1 and 57-71 under 35 U.S.C. § 112 first and second paragraphs, which applicant has responded to in the present amendment by amending claims 1, 57, and 58, to indicate the alternative uses of mixtures of lubricants by the expression "or mixtures thereof." Applicant also addressed these rejections on pages 9-11 in the January 22 Brief.

The examiner rejects claim 1 under 35 U.S.C. § 102 (b) as anticipated by Hopkins Jr. et al. United States Patent 5,362,788 in combination with the Merck Index, and admitted prior art. Applicant traverses the rejection and requests further consideration and reexamination for the reasons set forth on pages 11-14 of the January 22 Brief.

The Examiner rejects claims 1, 57, 63 and 70 under 35 U.S.C. §102(b) as anticipated by the Admitted Prior Art, i.e., Levy, United States Patent No. 4,985,251 combined with Brannon-Peppas. Applicant traverses the rejection and requests further consideration and reexamination for the reasons set forth on pages 14-16 of the January 22 Brief.

The Examiner rejects claims 1, 57-58, 63-64, and 69-70 under 35 U.S.C. §102(b) as anticipated by Geursen et al. WO93/18223 ("Geursen"). Applicant traverses the rejection and requests further consideration and reexamination.

Guersen discloses a process for treating a substrate such as a fiber or fibrous product with a superabsorbent material and addresses the dual problem, on the one hand of developing a flowable aqueous emulsion having a sufficient amount of superabsorbent polymer to form a coating that acts as a water barrier, and on the other, of providing a formulation that did not gel because of the superabsorbent polymer.

Geursen specifically notes:

The drawback to impregnating a substrate with a superabsorbent material dispersed in an aqueous system is that, due to the superabsorbent's high viscosity-enhancing action, steady feeding of it is extremely difficult if not impossible. Further, on account of the restricted superabsorbent concentration in the impregnating liquid only a small quantity of superabsorbent material can be applied to the yarn per treatment. Another drawback to this method is that the comparatively large amount of impregnating liquid which is applied to the substrate with the superabsorbent material has to be removed by evaporation.

Geursen WO 93/ par. bridging pp. 4-5; U.S. column 2, lines 57-67.¹

The superabsorbent polymer employed by Geursen does not dissolve in water, so Geursen formed an emulsion of the polymer in water by polymerizing the water soluble monomer in a water-in-oil emulsion to form the polymer in the aqueous phase. (WO 93/ p. 7, lines 16-19; U.S. Col. 4, lines 1-16)². Geursen uses the emulsion as a

¹ Willemsen et al. U. S. Pat. No. 6,319,558 ("Willemsen"), assigned to Akzo Nobel, as is Geursen, acknowledges the same problem. Willemsen USPTO Patent Full Text and Image Data Base, p.4, par. 1.

coating, and subsequently heat-treats it to drive off the water phase and oil phase, generally a relatively low boiling paraffin hydrocarbon. (WO 93/ p. 5, lines 19-28; U. S. Col. 3, lines 15-23). Geursen also discloses commercially available water-in-oil emulsions prepared in the same way, which may also include additives, such as lubricants and emulsifying agents. (WO 93/ p. 7, lines 20-27, p. 8 lines 10-14; U. S. Col. 4, lines 17-26; 42-47).

The disclosed aqueous polymerization of the monomer into a superabsorbent polymer resulted in a polymer that absorbs about 45 or 20 times its weight in water. An examination of the Geursen examples will show that the reference contains experimental data showing only the production of these low water absorbing superabsorbent polymers, and the desirability of using them and not superabsorbent polymers that absorb greater than about 100 times their weight in water. Geursen therefore teaches away from the use of superabsorbent polymers that absorb greater than about 100 times their weight in water, and also lacks an enabling disclosure of how to produce oil in water emulsions of superabsorbent polymers that absorb greater than about 100 times their weight in water.

The reference describes yarns coated with a superabsorbent polymer composition which have a "swelling value" (WO 93/ p. 13 line 15 to p.14 line 5; U. S. Col. 7, lines 19-44) defined by a formula (WO 93/ p.13, lines 9-14; U. S. Col. 7, lines 45-51). The swelling value consists of a number that indicates the relative water absorbency of the yarn or the yarn coated with the superabsorbent polymer composition.

2 Guersen forms a coating "via an emulsion of the superabsorbent in a water-in-oil-emulsion, the superabsorbent material being present in the aqueous phase of the emulsion." WO 93/ p.7, lines 1-5; U.S. col. 3, lines 64-67 (emphasis added).

The following analysis of the data in Geursen bears out the reference does not teach or suggest superabsorbent polymers that can absorb greater than about 100 times their weight in water for the process or product disclosed.

Table A, reports the swelling values of a polyester yarn coated with a superabsorbent water-in-oil emulsion. Prior to coating, the yarn had a swelling value of 9 (WO 93/ p. 17, line25; U. S. Col. 9, lines 34-35). The formula in WO 93/ p.13, lines 9-14; U. S. Col. 7, lines 45-51 gives the swelling value of the superabsorbent polymer:

$$\text{swelling value} = \frac{(a - b) \times 100}{b}$$

Arbitrarily setting the weight of the yarn (the value for "a") at 100 grams will give the dry weight of the yarn (the value for "b") as follows:

Example 1	Swelling value of <u>uncoated</u> yarn = 9 (Col. 9, lines 34-35)
$\frac{100-b}{b}$	= 0.09
100	= 1.096b
b	= 91.74 (dry weight of yarn)

$$\text{Yarn water absorption} = 100 - 91.74 = 8.26$$

Example 1	Swelling value of <u>coated</u> yarn = 114 (Col. 9, line 28)
$\frac{100-b}{b}$	= 1.14
100	= 2.146b
b	= 46.72 (dry wt. of yarn and superabsorbent polymer)

Coated yarn water absorption = $100 - 46.72 = 53.28$

$53.28 - 8.26 = 45.02$ water absorbed by superabsorbent polymer

$46.27 \times 2.1\%$ polymer (Col 9, line 28) = 0.97 superabsorbent polymer on yarn

$\frac{45.02}{0.97} = 46.3$ Superabsorbent polymer absorbs 46.3 times its weight in water.

This shows that 0.97 grams of superabsorbent polymer picked up or absorbed 45.02 grams of water or 46.3 times its weight in water, less than one-half of that of applicant's claimed superabsorbent polymer which absorbs greater than about 100 times its weight in water.

The reference also shows Example 3 uses the same yarn employed in Example 1 but with the application of 7.0 weight percent of the same superabsorbent polymer employed in Example 1. Also the swelling value of the sample increased from 114 in Example 1 to 171 in Example 3. Using the method above (pp. 6-7 of this brief), shows that the superabsorbent polymer of Example 3 had a water absorbency of about 20 (actually, 21.2, which sets the superabsorbent polymer concentration at about 80 weight %) as compared to the water absorbency of Example 1 of 45 (i.e., a superabsorbent polymer concentration of 55 weight %).

The same calculations will show the superabsorbent polymer of experiment 4 (Table B) coated on a nylon-6,6 yarn absorbs about the same amount of water, i.e., less than about one half applicant's claimed superabsorbent polymer that absorbs greater than about 100 times its weight in water.

These data from Guersen clearly show the inventors did not know how to combine a lubricant with a superabsorbent polymer that absorbs greater than about 100 times its weight in water, or the desirability of doing this. Since the reference does not disclose this type of polymer coating or how to produce it, Geursen does not contain an

enabling disclosure. Applicant, on the other hand, has disclosed methods on how to combine superabsorbent polymers that absorb greater than about 100 times their weight in water with lubricants and use the combination as a lubricant.

Guersen attempted to address the problem of coating a superabsorbent polymers on yarn in light of the primary difficulty the industry had with them, namely that when combined with water they caused extremely high viscosities at a relatively low concentration. The superabsorbent polymer formulation sought by Guersen, not only had to have some flowable characteristics in order to apply it as a coating material, but also had to have a relatively high solids content. Cf. Guersen, WO 93/ par. bridging pp. 4-5, U.S. column 2, lines 57-67.

Guersen addressed this problem by polymerizing the superabsorbent monomer to form an emulsion with the superabsorbent polymer in the water phase. Analyzing the nature of water-in-oil emulsions will illustrate further how Guersen achieved the goal of not only providing a superabsorbent polymer formulation having relatively high superabsorbent polymer solids, but also a flowable composition that could be coated onto a substrate with relative ease.

This water phase consists of very small droplets of superabsorbent polymer in combination with water (the discontinuous phase) suspended in the oil phase (the continuous phase). One can easily visualize that the viscosity of the droplets made up of water and a superabsorbent polymer would have little, if any, effect on the oil or continuous phase if the particles were sufficiently mobile in the continuous phase, e. g., by employing a sufficient volume of the continuous phase. By utilizing an emulsion, Guersen addressed the major problem caused by the high viscosity superabsorbent polymers, namely their tendency to impart high viscosity to the formulation. Guersen

thereby obtained a formulation that flowed readily and fulfilled the need to employ superabsorbent polymers as an easily applied coating.

Geursen, however, had to address another problem, namely the superabsorbent polymer solids content in the dispersed phase or the droplets. If he employed a superabsorbent polymer that absorbed 1,000 times its weight in water the droplets would contain 1,000 parts by weight of water for every one part of superabsorbent polymer (0.1% superabsorbent polymer) and he would not resolve the problem of applying a sufficient amount of superabsorbent polymer onto a substrate so it could act as a water barrier. Similarly if he used a superabsorbent polymer that absorbed greater than about 100 times its weight in water, each droplet would contain about 100 parts by weight of water for one part of superabsorbent polymer (1% by weight of superabsorbent polymer). In both instances, the superabsorbent polymers would not provide a high solids coating.

Geursen appears to address this solids problem by using a superabsorbent polymer that absorbs only about 45 times its weight in water, and using the analysis above, each droplet of the emulsion would contain about 55 parts by weight of superabsorbent polymer and 45 parts by weight of water, a 55-fold increase in solids over a superabsorbent polymer that absorbs about 100 times its weight in water. Geursen employing a superabsorbent polymer that absorbed about 20 times its weight in water gave him a solids content of 80 parts of the polymer, amounting to an 80-fold increase over a superabsorbent polymer that absorbs about 100 times its weight in water.

Using superabsorbent polymers that only absorb about 45 or 20 times their weight in water allowed Geursen to achieve the dual objective of not only laying down

relatively large amounts of superabsorbent polymer as a coating, but also avoiding the problem of removing large quantities of water from the substrate.

Geursen also appears to avoid this problem of high water absorbing superabsorbent polymers by using a sodium sulphonate electrolyte in the emulsion polymerization process. For example, Guerssen, WO 93/ par. bridging pp.16-17; U. S. column 9, lines 8 et. seq. discloses using a sodium sulphonate ("sulpho") salt of the superabsorbent monomer.³

Levy (of record), however, discusses this well known technique of reducing both the viscosity and water absorbency of a superabsorbent polymer, observing:

normally, unmixed formulations of superabsorbent polymers and water have a tendency to form gels of such a high viscosity that they are not flowable. An additional technique used to render a viscous superabsorbent polymer composition . . . flowable, is the additional [sic, addition] of varying concentrations of one or more salt(s)/electrolyte(s) such as sodium chloride. . . . These salt(s)/electrolyte(s) have a tendency to interfere with the hydrogen bonding or reduce the hydrophilic bonding of the water to the gel. Also, superabsorbent polymers . . . absorb less water when electrolytes are present.

Levy, U.S. Patent No. 4,985,251 column 15, lines 12-26 (emphasis added).

Takeda et al. United States Patent No. 4,618,631 teaches the same phenomenon in table I at column 7, lines 41-55, Table II, column 8, lines 60-65, and Table III, column 10, lines 1-10. These data show that the addition of an electrolyte to a superabsorbent polymer reduces the water absorbency of the polymer by a factor of about ten. For example, the addition of an electrolyte to a superabsorbent polymer with a water absorbency of about 500 times its weight in water will reduce the absorbency of the

³ Geursen might also have employed sodium chloride as an electrolyte to achieve this result, which this brief discusses later.

polymer to about fifty times its weight in water. Garner et al. Journal of Chemical Education, January 1997, Vol. 74 No. 1, p. 95 describes this as well.

This raises the question as to whether or not Geursen added sodium chloride or a similar salt to the superabsorbent polymer emulsion to reduce the water absorbency of the polymer. A further examination of the data reported in Table A of Geursen suggests this. The superabsorbent polymer of Example 1 of Geursen absorbed about 45 times its weight in water, whereas the superabsorbent polymer of Example 3 absorbed about 20 times its weight in water. Bearing in mind that Geursen employed the same superabsorbent polymer in both examples, the skilled artisan would know that something was done in the experiments to obtain that difference in water absorbency, but not reported. Applicant believes that Geursen added a salt such as sodium chloride to the emulsion of Example 3 to change the water absorbency of the superabsorbent polymer.

Another factor that influences the absorbency of these superabsorbent polymers is the degree of polymer cross-linking, but Geursen doesn't discuss this, even though known in the prior art, e.g., Garner et al. supra. Geursen by employing the same superabsorbent polymer in both examples 1 and 3 does not appear to have changed the cross-linking of the superabsorbent polymer. Geursen also discloses the addition of other components to the polymerization reaction, without indicating anything about the effect they may have on water absorbency of the polymer obtained. Geursen, WO 93/ par. bridging pp. 7-8, p. 8, lines 20-30; U.S. column 4, lines 28-33, lines 51-58.

Although Geursen might appear to disclose using superabsorbent polymers having water absorbencies greater than 100, (WO 93/ par. bridging pp.12-13; U.S. column 7, lines 1-6) he does not. A closer reading of the reference shows this

disclosure relates to a "product" further described as a combination of the substrate with the superabsorbent polymer, and not the superabsorbent polymer alone. WO93/ lines 23-24; U.S. column 6, lines 57-60. As illustrated above, Geursen's substrates absorb water and have an affect on the overall water absorbtion of the combination. The water absorbtion of the "product" takes into account the combined effect of the substrate absorbing water and the polymer absorbing water. Geursen therefore does not teach the use of a superabsorbent polymer having a water absorbency greater than about 100, but rather the water absorbency of the "product" which is the substrate combined with the superabsorbent polymer.

Because Geursen teaches superabsorbent polymer coatings that absorb only about 45 or 20 times their weight in water, the reference clearly raises the question of how the skilled artisan gets over the hurdle of this water absorbency of 45 or 20 to arrive at applicant's lower limit of water absorbency greater than about 100, and why she or he would be led by the reference to do this? The reference clearly lacks an enabling disclosure of how to do it. The Examiner therefore has not met the burden of providing evidence that Geursen does in fact show a superabsorbent polymer in an aqueous medium suitable for coating a substrate, where the superabsorbent polymer absorbs greater than about 100 times its weight in water. Lacking this evidence, the rejection cannot stand.

The Examiner rejects claims 1, 57, 63-64, and 69-71 under 35 U.S.C. §103(a) as unpatentable over Sayad et al. United States Patent No. 3,336,225 ("Sayad") combined with admitted prior art in view of Hopkins, and Geursen. Applicant traverses the rejection and requests further consideration and reexamination for the reasons set forth

on pages 16-23 of the January 22 Brief, and the additional reasons set forth above for distinguishing Geursen.

The Examiner rejects claims 58-62 and 65-68 under 35 U.S.C. §103(a) as unpatentable over Sayad combined with Admitted Prior Art in view of Hopkins and Guersen, and further in view Schey and Booser. Applicant traverses the rejection and requests further consideration and reexamination for the reasons set forth on pages 23 - 25 of the January 22 Brief, and the additional reasons set forth above for distinguishing Geursen.

Applicant further traverses all of the rejections since the combination of references relied on by the Examiner provide no motivation to combine their teachings, and secondly the examiner has improperly relied on non-analogous art to make the rejections, all of which applicant has elaborated on at pages 24-27 of the January 22 Brief.

The Examiner provisionally rejects claims 57-71 under the judicially created doctrine of obviousness-type double patenting in view of copending application Serial No. 09/357,957 filed July 23, 1999. Applicant points out that the present Examiner has also issued a provisional double patenting rejection in copending application Serial No. 09/357,957, which has not issued as a patent. Applicant should not be required to file a terminal disclaimer in the present application since the Patent Office may not allow the copending application which forms the basis of the double patenting rejection. When a provisional double patenting rejection is the sole remaining rejection in an application otherwise in condition for allowance, the M.P.E.P. states that the Examiner should withdraw the rejection in the application and permit it to issue as a patent. M.P.E.P. § 804(I.)(B) p. 800 -15 July 1998.

Importantly, the examiner has committed to addressing the provisional double patenting rejection in the foregoing manner at page 7 last paragraph of her April 4, 2002 Office Action.

CONCLUSIONS

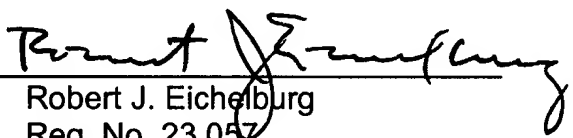
Applicant requests the Examiner to withdraw the rejections in view of the foregoing amendments and remarks and pass the application to issue .

Respectfully submitted,

THE LAW OFFICES OF ROBERT J. EICHELBURG

Dated: September 4, 2003

By: _____


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Dated: September 4, 2003